

GEOL 220A Geologic Field Experiences: West Virginia Spring Term, 2008

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Meeting Times: 2:15-3:15 p.m., Monday & Wednesday; 1:00-3:50 p.m., Friday.

Textbooks: Sedimentary Rocks in the Field: A Color Guide by Dorrik A. V. Stow, 2005.

Manson Publishing Ltd. London, UK. 320 p. ISBN # 0-12-369451-5.

An Introduction to Geologic Structures and Maps, 7th ed. by George M. Bennison & Keith A. Moseley, 2003. Oxford University Press, Inc.. New York. 160 p. ISBN # 978-0-340-80956-3.

Required Materials: Field book, acid bottle, 10X hand lens, and topographic map. Rock hammer optional but recommended. This equipment is available for purchase from the department.

Course Fee: There is no course fee. Lodging and travel expenses will be paid by the department. Students are responsible for purchasing their own meals.

COURSE ORGANIZATION

"And some rin up hill and down dale, knapping the chucky stanes to pieces wi' hammers, lake sae many road makers run daft. They say it is to see how the world was made."

Sir Walter Scott

St. Ronan's Well - 1824

(From Finch et al., 1980)



Geologic Field Experiences is an intermediate level course in which you will learn the basic methods of field geology while at the same time learning to recognize and understand various geological structures and processes. The emphasis in this course is on the construction of geologic maps and cross sections based on data that you collect while doing field work, and the interpretation of the geologic history of a region based on your observations and field data, and information published in the primary literature. It is important to understand that often there are no right answers, but only hypotheses that cannot be falsified with the available data.

Geologic fieldwork also provides an opportunity for learning and using the scientific method. The scientific method involves the collection of data, the formation of a hypothesis to explain the data, the testing of the hypothesis by the collection of additional data, and the rejection, acceptance, or alteration of the hypothesis based on the results of the tests. Moreover,

communication of scientific data, interpretations, and hypotheses is an important component of scientific inquiry. You will write several short reports and a major geologic report in association with laboratory and fieldwork. Consequently, this course is being offered as a writing course because a major portion of your grade will be based on the effective presentation and defense of ideas in your reports.

The course is organized around several outdoor activities and a weeklong spring break field trip. All students must participate in all field activities to successfully complete the course. During the eight weeks prior to the spring break field trip you will learn how to use the Brunton Compass as a tool for both mapping and collecting geologic data at outcrops. You will learn how to make observations at outcrops and how to take useful field notes. We also will work a number of exercises that will help you learn about folds and faults and the criteria for recognizing them in the field. You will begin studying geologic maps to learn how data about folds and faults are represented on maps. Initially you will work with simple maps and then progress to more complex maps. You will construct geologic cross sections that require interpretation of the geologic data presented on the maps. During this process, you will become familiar with the various symbols and methods used to present data on geologic maps. Furthermore, you will begin to recognize and understand the relationships between topography, drainage patterns, lithology, and geologic structures.



In the weeks just prior to the field trip, you will learn about the geologic history of the Appalachian Mountains. Specifically, you will study the sequence of events, beginning in the Precambrian and culminating with the collision of Africa and North America during the Pennsylvanian, that produced the rocks and structures found in the modern Appalachian Mountains. After this "big picture" view of the Appalachian Mountains, we will begin preparing for the field trip. You will become familiar with the stratigraphy of the Smoke Hole region by studying a suite of rock specimens in the lab. We also will examine the topographic base map to see what we can learn about the geology based on topographic expression.

During the spring break field trip we will stay in cabins in Petersburg, West Virginia. Our days will be spent hiking in the rugged topography of the Smoke Hole region using topographic base maps. As we find outcrops, we will collect pertinent data. In the evenings, data will be plotted on base maps and we will construct hypotheses that can be tested the following day. After six days of mapping in the Smoke Hole region, you ought to have a

reasonably good set of data from which to construct a geologic map and several cross sections. You will prepare these during the weeks following the trip and include them as part of a major geologic report on the geology of the Smoke Hole region, West Virginia.

Weeks nine through fourteen will be spent working on the Smoke Hole geologic map and cross-sections, and preparing the geologic report. We will meet regularly at the assigned times, and drafts of specific items will be due periodically.

This course will give you the opportunity to learn about the earth by actually doing geology. Hopefully, you will experience the excitement of scientific inquiry and discovery and, in the process, learn more about geology and about how geologists do science.



COURSE GOALS

- (1) Introduction to the equipment and methods used in field geology.
- (2) Learn to apply the scientific method to the solution of geologic problems.
- (3) Learn to recognize large scale landforms and geologic structures based on field data that illustrate three dimensional spatial relationships of rock units.
- (4) Learn about the constructional and destructional processes that shape the surface of the earth.
- (5) Gain substantial knowledge about the geology of the Appalachian Mountains.

EXIT SKILLS

- (1) Use of a brunton compass to determine bearings and to measure strike and dip of rock units.
- (2) Understand spatial and age relationships in anticlines and synclines, including plunging, symmetric, asymmetric, overturned and recumbent folds.
- (3) Understand spatial and age relationships of rocks associated with geologic faults.
- (4) Determine relative ages of structures and events from geologic maps.
- (5) Use of field data to produce a geologic map on a topographic base map.
- (6) Construction of geologic cross sections from geologic maps.
- (7) Preparation of a geologic report.

COURSE OUTLINE

WEEK	TOPICS	READING ASSIGNMENT
1 (1/28)	Introduction to Field Geology, Geologic Maps, Geologic Cross Sections, and Stratigraphic Columns The Brunton Compass Assignment #1 Compass Bearings Assignment #2 Pace and Compass Traverse	Ch. 1, Stow Ch. 2, Stow
2 (2/4)	Horizontal and Dipping Strata Measuring strike and dip of inclined beds Assignment #3 Chapter 1 maps	Ch. 1, B&M
3 (2/11)	‘Three-Point’ Problems Siliciclastic Sedimentary Rocks and Outcrops Assignment #4 Chapter 2 maps Assignment #5 Three point problem Assignment #6 Outcrop and Rock Descriptions (W Assignment) Friday: Field trip to Cagles Mill Spillway	Ch. 2, B&M Ch. 3, Stow Ch. 4-6, Stow
4 (2/18)	Folding Assignment #7 Chapter 4 maps	Ch. 4, B&M
5 (2/25)	Describing Carbonate Rocks and Outcrops Assignment #8 Carbonate Sedimentary Rocks and Outcrops (W Assignment) Friday: Field trip to St. Genevieve Limestone Outcrops	Ch. 7 & 8, Stow
6 (3/3)	Faulting Assignment #9 Chapter 6 maps	Ch. 6, B&M
7 (3/10)	Stratigraphy of the Smoke Hole Region, West Virginia Mountain Belt Architecture History of the Appalachian Mountains Assignment #10 Smoke Hole Rock Descriptions (W Assignment)	
8 (3/17)	Geologic Mapping Constructing Geologic Maps and Cross Sections	

FIELD TRIP: APPALACHIAN MOUNTAINS IN WEST VIRGINIA
Saturday 3/22/08 - Saturday 3/29/08

Assignment #11 Geologic Report: Geology of the Smoke Hole Region, Pendleton County, West Virginia (Writing Assignment).

Report will include:

- (1) Stratigraphic column showing major rock units.
- (2) Geologic map based on your field work.
- (3) Geologic cross sections (assigned).
- (4) Text describing stratigraphy, environments of deposition, structural geology, geomorphology, and geologic history of the Smoke Hole Region.

Weeks 9-14 will be used to work on the map, cross sections, and text for the Smoke Hole Report.

GRADING

<u>Assignment #</u>	<u>Weighting</u>
1	2%
2	5%
3	5%
4	5%
5	5%
6	6%
7	5%
8	5%
9	6%
10	6%
11	50%

A = 90-100% B = 80-89% C = 70-79% D = 60-69% F < 60%
(To get W certification you must have a final grade of C- or better.)